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Dated 20 SEP 1996

For official use

16 AUG 1995

9516762.3

r reference
JR/P5148GB

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The Patent Office — Request for grant of a Patent

Form 1/77

Patents Act 1977

❶ Title of invention

1 Please give the title of the invention: COMPUTER SYSTEM FOR IDENTIFYING LOCAL RESOURCES

❷ Applicant's details

❑ **First or only applicant**

2a If you are applying as a corporate body please give:

Corporate name

Country *(and State of incorporation, if appropriate)*

2b If you are applying as an individual or one of a partnership please give in full

Surname PHELAN

Forenames SEAN PATRICK

2c **In all cases**, please give the following details:

Address
Waverley Cottage,
24 Merton Rise,
London,

UK postcode NW3 3EN
(if applicable)

Country United Kingdom

ADP number
(if known) 6833016001

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16 AUG 1995

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3a Have you appointed an agent to deal with your application?

Yes [X] No [ ] ➡ ***go to 3b***

⬇ ***please give details below***

Agent's name
W.H. BECK, GREENER & CO.,

Agent's address

7 Stone Buildings,
Lincoln's Inn,
London,

Postcode WC2A 3SZ

Agent's ADP number 323001

3b: If you have appointed an agent, all correspondence concerning your application will be sent to the agent's United Kingdom address

3b If you have not appointed an agent please give a name and address in the United Kingdom to which all correspondence will be sent:

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❶ Reference number

4 Agent's or applicant's reference number *(if applicable)* JR/P5148GB

❻ Claiming an earlier application date

5 Are you claiming that this application be treated as having been filed on the date of filing of an earlier application?

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Yes ☐ No ☒ ➡ *go to 6*

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15(4) (Divisional) ☐ 8(3) ☐ 12(6) ☐ 37(4) ☐

❻ Declaration of priority

❻ If you are declaring priority from a PCT Application please enter 'PCT' as the country and enter the country code (for example, GB) as part of the application number.

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Country of filing	Priority application number *(if known)*	Filing date *(day, month, year)*

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Inventorship

7 Are you (the applicant or applicants) the sole inventor or the joint inventors?

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❽ *Please supply duplicates of claim(s), abstract, description and drawing(s).*

❽ Checklist

8a Please fill in the number of sheets for each of the following types of document contained in this application.

Continuation sheets for this Patents Form 1/77			
Claim(s)	5	Description	16
Abstract		Drawing(s)	3

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8b Which of the following documents also accompanies the application?

Priority documents *(please state how many)*	
Translation(s) of Priority documents *(please state how many)*	
Patents Form 7/77 – Statement of Inventorship and Right to Grant *(please state how many)*	
Patents Form 9/77 – Preliminary Examination/Search	
Patents Form 10/77 – Request for Substantive Examination	

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I/We request the grant of a patent on the basis of this application.

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Signed W.H. BECK, GREENER & CO, Agents for the Applicant

Date 16 (day) 08 (month) 1995 (year)

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COMPUTER SYSTEM FOR IDENTIFYING LOCAL RESOURCES

This invention relates to computer systems, and to methods of operating computer systems, and has particular relevance to the so called "World Wide Web", which is part of the global computer network system known as the Internet.

The Internet and the World Wide Web ("The Web") have been described in great detail in a large number of publications in recent months. The web consists essentially of an enormous number (at the last count, many millions, and expanding rapidly) of "host" or "server" computers which contain information of various types which users may wish to access. Users of the system employ a "client" computer, running "client" software, in order to access the information. Such client programs are usually known as "browsers".

Various standard protocols enable requests to be formulated by the many client computers, and passed via the Internet to whichever computer holds the relevant information, which then returns the information to the client, using the same protocols.

The protocol which is used on the World Wide Web is an agreed standard, known as the HyperText Transfer Protocol (HTTP).

The language in which "Web" pages are generated is known as "HyperText Markup Language" (HTML).

The success of HTML/HTTP is based to a large extent on the ability of HTTP to produce so called "hypertext links" in the form of some sort of displayable icon on the computer screen of the client. The icon may be a graphical

icon, or, more commonly, simply text represented in a form which is visually distinct from the surrounding text. Activating the icon with a pointing device (for example, clicking on it with a mouse pointer) causes the browser software to formulate a request for further information to be sent to the "client". This further information may be simply a "page" of text data, or it may be graphical data, or sound or video data. It may reside on the same server computer as the page containing the hypertext link, but need not do so, and will often reside on a computer many thousands of miles away.

The World Wide Web has attracted increasing attention in recent months as an advertising medium for various goods and services. The advantage of the Web as an advertising medium is that a single connection allows access by millions of potential customers around the world, without any need for the customers to know or be interested in the physical location of the server computer which is providing the information. Links to the pages of interest may be provided by hundreds or thousands of other pages, provided on other servers, throughout the world.

For many goods and services, the lack of a physical "place" on the Internet is an advantage. A consumer, no matter where his location, is presented with a familiar interface, which makes access very straightforward. The very size of the World Wide Web however, means that, as presently constituted, it is not well suited to answering questions about places and proximity. For example, it is not possible, using existing Web search tools to answer questions such as "where is the nearest hamburger restaurant" in spite of the enormous benefit which would accrue to major restaurant chains and the like in providing their own answers to such questions, with the speed and ease for which the Internet is famous.

The present inventions seeks to address the problem of facilitating access by internet users, and in particular by users of the World Wide Web, to internet resources, where the primary differentiator between different places of interest is geographical.

In accordance with the present invention, this can be achieved by storing on a first server (or "map" server) data which is representative of a map of a geographical area, and of data representing the spatial coordinates of at least one point associated with the area. Data relating to places of interest within the geographical area is provided, on a second (or "overlay") server computer. The data stored on the second ("overlay") server also includes data representative of the spatial coordinates of places of interest within the area.

A client computer or "browser" is able to retrieve the map data from the first server, and display the map on a visual display unit. The client is also capable of formulating a request to the overlay server to identify places of interest known to it, and lying within the displayed geographical area. This data is retrieved from the overlay server and the retrieved information is also displayed on the client VDU. Preferably the information retrieved from the overlay server is superimposed on the map display (for example in the form of a "hypertext" link) at a position on the image corresponding to the location of the place of interest on the map.

Accordingly, in a first aspect of the invention, there is provided a method of operating a computer system which method comprises

providing a first server computer;

storing on the first server computer data representative of a map of a geographical area;

storing on the first server computer co-ordinate data indicative of the spatial co-ordinates of at least one point associated with the said geographical area represented by the map, so as to enable correlation of points on the map with their corresponding geographical location;

providing a second server computer;

storing on the second server computer data relating to at least one place of interest within the said geographical area, said data including data representative of the spatial co-ordinates of the said place of interest within the area;

providing a client computer, the client computer having a visual display unit;

interrogating the first server computer from the client computer, and transmitting from the said first server computer to the said client computer in response to the said interrogation the said map data and the said co-ordinate data associated with the area represented by the map;

utilising the said map data to display an image of the said map on the said visual display unit;

formulating at the client computer based on the said co-ordinate data a request to the said second server computer to identify places of interest known to it and lying within the said geographical area;

transmitting the request to the second server computer;

transmitting from the second server computer to the client computer in response to the said request the said data relating to at least one place of interest within the said geographical area, and

displaying the said data relating to at least one place of interest on the said visual display unit.

In a second aspect of the invention, there is provided

a computer system which comprising:

a first server computer for storing data representative of a map of a geographical area and co-ordinate data representative of the spatial co-ordinates of at least one point lying within the area represented by the map;

a second server computer for storing data representative of at least one place of interest within the said geographical area, said data including data representative of the spatial co-ordinates of the said place of interest within the area,

a client computer, the client computer having a visual display unit;

wherein the client computer includes

means for interrogating the first server computer to request transfer to the client computer of the said map data and the said co-ordinate data associated with the area represented by the map,

means for displaying an image of the said map on the said visual display unit,

means for formulating based on the said co-ordinate data a request to the said second server computer to identify places of interest known to it and lying within the said geographical area, and

means for transmitting the request to the second server computer;

wherein the second server computer includes means for transmitting to the client computer in response to the said request the said data representative of at least one place of interest within the said geographical area, and

wherein the said client computer includes means for displaying said data associated with the said place of interest, on the said visual display unit.

The term "first server" and "second server" as used herein are not meant to imply any particular restriction as

to the order in which the said servers are accessed by the client. As with any Web search, a link provided initially by the second ("overlay") computer may link directly to a map in accordance with the invention.

The information relating to the place of interest may be superimposed on the map image at a position on the image corresponding to the location of the place of interest on the map. Thus, for example, the overlay server may contain details of, for example, hotels, restaurants, shops or the like, associated with the geographical coordinates of each location. The map server contains map data, including co-ordinate data representing the spatial coordinates of at least one point on the area represented by the map. Further data is also required, so as to enable correlation of points on the map with their corresponding geographical location. Such further data may be, for example the coordinates of an additional point on the map. Preferably, co-ordinates of two opposite corners of the map are included. Alternatively, the said further data may include a simple scale factor and a direction factor.

In a further preferred embodiment, the map server may be provided with a list of categories of places of interest, together with details of the respective overlay servers on which further information about each category is located. Each of these categories may be associated with a respective icon on the VDU of the client. In an alternative embodiment, such a list of categories may be provided on a further server.

Initially, the client computer may display the map as a simple outline, with no superimposed icons. When one of the "category" icons is activated (for example, by clicking with a mouse) the client computer formulates a request to the appropriate overlay server, for the overlay server to

supply a list of locations known to it which lie within the rectangle defined by the said coordinates. The information supplied by the overlay server may include textual, graphical, sound, video or other information, and may include additional hypertext links to other locations or facilities on the Web, which themselves may include textual, graphical, sound, video or other information.

It is a particular advantage of the system that the various overlay servers (information providers) do not need to have knowledge of the "map server" software provided on the map server, and *vice versa*. All that is required in order for the relevant data to be supplied to the client computer is a consistent protocol for providing the co-ordinates of the various places of interest.

Two or more servers can provide "places of interest" data independently, without either having any knowledge of the other. For example, one server may provide locations of hotels, a second may provide locations of restaurants, and a third may provide locations of print shops or the like. All of the data (for example, hypertext links, icons etc.) can be overlaid on a single map on the screen of the client computer with hypertext links provided to the various source data on the different overlay server computers.

In a particularly preferred embodiment, the client computer may include means for establishing the current geographical location of the client computer by means of a Global Positioning System (in particular, a satellite system) and for passing the said location information to the overlay server computer. Such location information may be utilised by the overlay server computer to identify facilities within a given radius of the current geographical location of the client computer. This

facility makes the method of the invention of particular usefulness to portable computer systems.

The client computer may include means for scrolling or zooming the map image, to display an image of a different geographical area, and means for varying the displayed data relating to the places of interest, so as to take account of the change in the display geographical area. This may take the form simply of changing the position of the icon or hypertext data relating to particular points of interest, so as to take account of the change in the display geographical area. Preferably, however, the client computer may include means for formulating a further request to an overlay server, to identify places of interest lying within the new geographical area.

A preferred embodiment of the invention is illustrated in the accompanying drawings, in which:

Figure 1 is a graphical representation of a client screen, showing a simple map with "category" icons;

Figure 2 shows the same map after retrieval of information relating to various places of interest (in this case, hotels and restaurants), and

Figure 3 is a schematic representation of information flow between the map and overlay servers and the client computer.

Referring to Figure 1, the screen of a client computer is shown, displaying a map, which fills most of the screen, and supplied, in a generally conventional form, from a server computer. The map may be supplied by the server in any of the various conventional graphics formats, for example in "JPG", "GIF" or "BMP" format.

The information supplied by the map server also includes the geographical coordinates of the bottom left corner of the map, and the top right corner of the map. In the case illustrated, this is supplied by the map server computer as a pair of real numbers (representing latitude and longitude in degrees), for each of these two corners of the map.

Also supplied by the map server or "map server" are the icons 2, 3, 4, and 5 which are displayed within a panel 6, on the right side of the screen. Icon 2 indicates banks, icon 3 restaurants, icon 4 hotels, etc. Information relating to each category of facilities (banks, restaurants, hotels etc.) is held on a server computer. The server computers for the different information categories may be the same or different.

Clicking with the mouse on a respective icon causes the client computer to formulate an information request, which may be in the form of a standard Web URL (Uniform Resource Locator) including additional protocol elements relating to the location which the user wishes to search.

The overall information flow is indicated graphically in Figure 3.

Figure 3 shows the two key transaction types used by the client. The first transaction type consists of an information request, which goes to a provider of information to be overlaid on a map, followed by a response. The second is a map request, which goes to a map server, followed by a map response back to the client.

Both request types take the form of Uniform Resource Locators (URLs) which are transmitted in the same way as any other WWW request. Unlike other URLs, the map and

information requests contain longitude and latitude information which specify the request's geographical coverage.

The responses also contain longitude and latitude information. The information response consists of a text file containing a series of references to WWW pages (HTML Anchors) each with an associated longitude and latitude. The Map response consists of an image file together with the longitude and latitude range that the file covers.

The protocols and transactions described above are distinct from other protocols and transactions on the World Wide Web.

An important feature of the present invention is the addition of a universally recognised standard for geographic reference (for example longitude and latitude) to the protocols and standards of the Internet and the World Wide Web, and its use to combine data from mutually independent sources.

Information requests produced by the client computer may be of various forms, provided that the protocol is provided for the exchange of the geographical co-ordinate data.

As indicated above, the information request is generally in the form of a URL (Uniform Resource Locator) which identifies a resource. This may be a simple text file, or may be a search of a suitably equipped database.

An example of a simple text file request is one of the form

http://mapping.com/example.mmm

the text file may be held on any web server, but in this example is held on the server "mapping.com".

In this example, the "MMM" identifier is an extension to the Internet URL standard, identifying a request in accordance with the present invention.

A more complex database search request may be of the form

http://mcdonalds.com/locations.mmm?NORTH="51.5449" WEST="0.16658" R="1.6"

This is a search request to a server called McDonalds.com requesting all locations within a one mile radius of a location in Hampstead, London. The search request contains three elements - NORTH, WEST and RADIUS - from the following list of possible search elements:

NORTH=51.5449	Longitude in degrees, as a single real number.
WEST=0.16658	Latitude in degrees, as a single real number.
RADIUS=1.6	Radius in kilometres.
MAX=10	Maximum number of locations in search result.
VR=0	Virtual Reality level - 0 for "reality", other values specify other "virtual worlds" for testing, simulation or whatever.

The information response takes the form or a text file which may contain HTML as well as MMM responses. The file has a MIME type of text/mmm and, in order to make them easily identifiable to web browsers, carry the filename extension "mmm".

The MMM information in a file is enclosed between the following two HTML tags:

<MMM> and </MMM>

Browsers which do not support MMM are expected to interpret these tags as unknown types and ignore them.

The MMM information between the MMM tags consists of a series of HTML anchors which contain longitude and latitude encoded in the same manner as in the Information Request, ie:

<a NORTH="51.5449""WEST=0.16658"HREF="http://mapping.com/indexhtm">MMM office

Browsers which do not support MMM are expected to display and interpret the parts of these anchors which they recognise, but ignore the longitude and latitude parts, which they will not recognise. The recognised parts will normally be displayed simply as standard hypertext links.

The map request URL is specified in a similar manner to the information request, ie:

http://mapping.com/london

http://mapping.com/london?NORTH="51.5449"WEST="0.16658"HI="4"WIDE="5"SCALE="100.00"

There are a number of other possible terms that may be included.

The Map Response is an image file encoded in either GIF or (preferably) JPEG format. It is sent in the same format as other image files on the web. It can therefore be displayed by browsers that do not support MMM as well as by browsers and helper applications that do.

The overall accuracy of the positioning of the overlaid data can be improved by dynamically georeferencing the coordinates in the Map Request URL to the map image in

the Map Response URL. This may be done within the HTTP header or by some further exchange of messages.

When the user clicks on one of the subject buttons, the client establishes a connection to the MMM server whose URL is embedded in the button. The client sends the locations, in longitude and latitude, of the top-left and bottom-right corners of its displayed map. Alternatively, the co-ordinate data may be sent in "polar" co-ordinate form (i.e., location of the map centre and radius).

The MMM server responds with a list of the URLs from its database having a longitude and latitude within the bounds specified. Each URL is associated with a displayable name and/or icon and a longitude and latitude. A few status fields may also be sent, such as "highlight", which can be used for levels of availability, etc.

The client software normally overlays the displayable names and/or icons on its map.

The user has the option of opening one or more icons from the screen, normally by clicking on the displayable name. This passes the URL to the web browser which opens it in the usual manner.

In Figure 2, the current location has been sent to three servers: one run by a high street bank, which returns the location of cashpoint machines, one by an independent hotel reservation system and one by a well-known restaurant chain.

The result of the response by the overlay server is shown in Figure 2, in which the same map is displayed with icons representing the various facilities reported by the second server, and hypertext links to text pages or other

Web facilities, in the usual way.

The architecture of the preferred systems is such that it can support a movable map window. A user can scroll North, South, East or West on the screen and see more detail appear, and can equally zoom in and out for more detail or for a wider perspective. This also enables a moving display, such as a rolling map installed in a car, to be dynamically updated with new locations as the displayable window moves over them.

Although the client computer may be a stationary PC connected to the Internet, the architecture is designed to support mobile clients such as car navigation systems and personal digital assistants (PDAs). The client software preferably supports direct connection to Global Positioning System (GPS) receivers, and will implement the NMEA 0183 standard for exchange of navigational data.

It is particularly preferred that the additional functionality provided within the World Wide Web, and its architecture is built within the extensible framework of HyperText Markup Language (HTML) and the HyperText Transfer Protocol (HTTP). The extensions to HTML/HTTP are thus preferably entirely compatible with existing Web standards and do not seek to modify, enhance or replace any part of the web architecture.

The software necessary to provide the MMM extensions to the client computer may be provided in the form of a standard "helper" application to a known Web browser (for example, Netscape, Mosaic etc.). The server computers may employ well-known standard database tools in conjunction with known Web server packages, in order to implement and respond to the MMM extensions to the standard HTML/HTTP protocols. The software on the client computer may be

such that, on receipt of an HTML "page" including data with the appropriate coding (in the example given, including the coding "mmm"), the helper application is launched, to provide the functionality which is made possible by the present invention. For example, the helper application may, on retrieving an HTML reference relating to a restaurant location, and containing a "mmm" reference cause the "mmm" reference to be displayed at an appropriate location on the client screen, and issue a request to a further "map" server to supply a graphic file in order to allow a graphic map to be overlayed behind the restaurant location. Such software functionality may also be incorporated within the basic client browser software

Software may be provided for the conversion of postal codes (zip codes) into longitude and latitude information.

The system according to the invention avoids the classical problems of Geographic Information Systems (GISs) by imposing a single, standardised geographic reference model, and restricting data exchanges to those classes of geographic information which can conform to the reference model.

Because of this, servers providing information do not have to deal with maps, map ownership issues or mapping software, information from several different sources can be integrated on a single screen, and maps and overlay information can be "persistent" - that is, can be stored in databases on the client computer and become a permanent feature of displays.

It is of course envisaged that the invention may be implemented in ways which are different from the ways specifically exemplified above. For example, the coordinate data embodied in the map and facility

information may be presented in ways other than in absolute latitude and longitude format.

Such alternative implementations are intended to be within the scope of the present invention, as embodied with the appended Claims.

CLAIMS

1. A method of operating a computer system which method comprises

providing a first server computer;

storing on the first server computer data representative of a map of a geographical area;

storing on the first server computer co-ordinate data indicative of the spatial co-ordinates of at least one point associated with the said geographical area represented by the map, so as to enable correlation of points on the map with their corresponding geographical location;

providing a second server computer;

storing on the second server computer data relating to at least one place of interest within the said geographical area, said data including data representative of the spatial co-ordinates of the said place of interest within the area;

providing a client computer, the client computer having a visual display unit;

interrogating the first server computer from the client computer, and transmitting from the said first server computer to the said client computer in response to the said interrogation the said map data and the said co-ordinate data associated with the area represented by the map;

utilising the said map data to display an image of the said map on the said visual display unit;

formulating at the client computer a request based on the said co-ordinate data to the said second server computer to identify places of interest known to it and lying within the said geographical area;

transmitting the request to the second server computer;

transmitting from the second server computer to the

client computer in response to the said request the said data relating to at least one place of interest within the said geographical area, and

displaying the said data relating to at least one place of interest on the said visual display unit.

2. A method as claimed in Claim 1, and including the step of superimposing information relating to the said place of interest on the said image on the said visual display unit, at a position on the said image corresponding to the location of the place of interest on the map.

3. A method as claimed in Claim 2, wherein the said information superimposed on the image is a hypertext link.

4. A method as claimed in Claim 2 or Claim 3, wherein the said client computer includes means for scrolling the said map image to display an image of a different geographical area, and means for varying the displayed data relating to the said at least one place of interest on the said visual display unit so as to take account of the change in the displayed geographical area.

5. A method as claimed in Claim 4, wherein the said varying of the displayed data includes the step of shifting the position of the superimposed information in response to scrolling of the said map image.

6. A method as claimed in Claim 5, wherein the client computer includes means for formulating a further request to the said second server, to identify places of interest lying within the said different geographical area.

7. A method as claimed in any one of the preceding Claims, wherein the said client computer includes means for zooming the said map image in or out to display an image of, respectively, a smaller or larger geographical area, and means for varying the displayed data relating to the said at least one place of interest on the said visual display unit so as to take account of the smaller or larger geographical area.

8. A method as claimed in Claim 7, wherein the client

computer includes means for formulating a further request to the said second server, to identify places of interest lying within the said smaller or larger geographical area.

9. A method as claimed in any one of the preceding Claims, including the steps of

storing on the first server computer a list of categories of places of interest,

retrieving the said list with the said map data, and

displaying on the said visual display unit a respective icon for each said category.

10. A method as claimed in any one of the preceding Claims, wherein formulation of the said request is effected by activation of a respective icon on the said visual display unit.

11. A method as claimed in any one of the preceding Claims, wherein the said request includes data representing the spatial co-ordinates of two diagonally opposite corners of the displayed image of the said map.

12. A method as claimed in any one of the preceding Claims, wherein the said client computer includes means for establishing the current geographical location of the client computer by means of a Global Positioning System, and means passing the said current geographical location of the client computer to the second server computer.

13. A method as claimed in Claim 12, wherein the said client computer includes means for superimposing on the said image an icon indicative of the said current geographical location.

14. A computer system which comprising:

a first server computer for storing data representative of a map of a geographical area and co-ordinate data representative of the spatial co-ordinates of at least one point lying within the area represented by the map;

a second server computer for storing data representative of at least one place of interest within the said geographical area, said data including data representative

of the spatial co-ordinates of the said place of interest within the area,

a client computer, the client computer having a visual display unit;

wherein the client computer includes

means for interrogating the first server computer to request transfer to the client computer of the said map data and the said co-ordinate data associated with the area represented by the map,

means for displaying an image of the said map on the said visual display unit,

means for formulating based on the said co-ordinate data a request to the said second server computer to identify places of interest known to it and lying within the said geographical area, and

means for transmitting the request to the second server computer;

wherein the second server computer includes means for transmitting to the client computer in response to the said request the said data representative of at least one place of interest within the said geographical area, and

wherein the said client computer includes means for displaying said data associated with the said place of interest, on the said visual display unit.

15. A computer system as claimed in Claim 14, wherein the client computer includes means for superimposing information relating to the said place of interest on the said image on the said visual display unit, at a position on the said image corresponding to the location of the place of interest on the map.

16. A computer system as claimed in Claim 15, wherein the said information superimposed on the image is a hypertext link.

17. A computer system as claimed in Claim 15 or Claim 16, wherein the said client computer includes means for scrolling the said map image to display an image of a

different geographical area, and means for varying the displayed data relating to the said at least one place of interest on the said visual display unit so as to take account of the change in the displayed geographical area.

18. A computer system as claimed in Claim 17, wherein the said client computer includes means for varying the information from the second server computer which is displayed, in response to scrolling of the said map image.

19. A computer system as claimed in Claim 18, wherein the client computer includes means for formulating a further request to the said second server, to identify places of interest lying within the said different geographical area.

20. A computer system as claimed in any one of Claims 13 to 19, wherein the said client computer includes means for zooming the said map image in or out to display an image of, respectively, a smaller or larger geographical area, and means for varying the displayed data relating to the said at least one place of interest on the said visual display unit so as to take account of the smaller or larger geographical area.

21. A computer system as claimed in Claim 20, wherein the client computer includes means for formulating a further request to the said second server, to identify places of interest lying within the said smaller or larger geographical area.

Figure 1

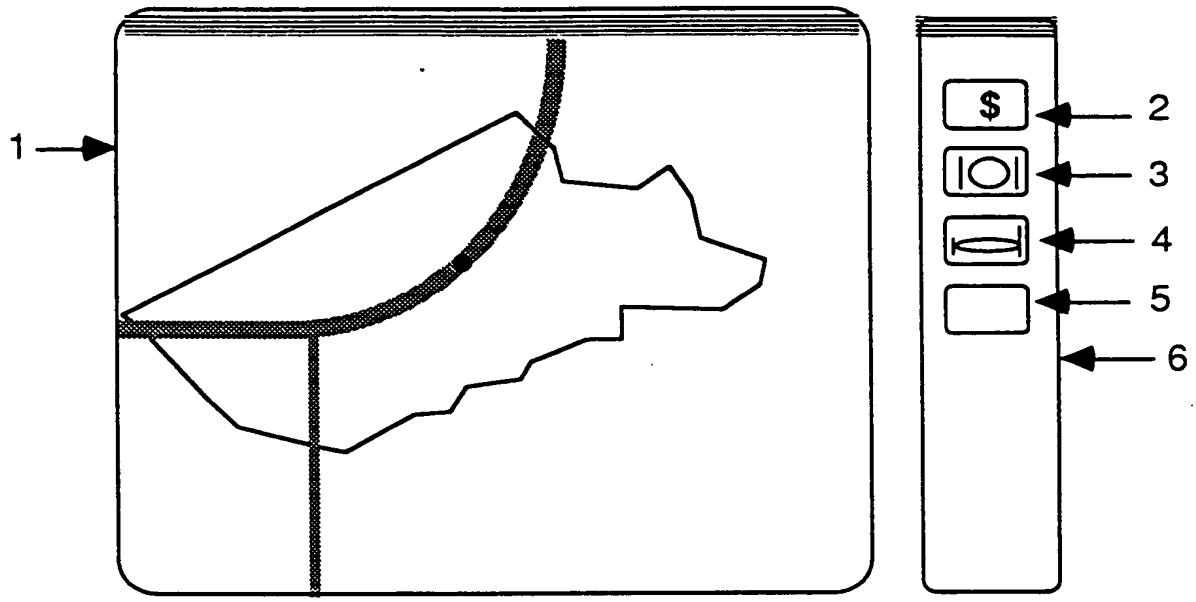


Figure 2

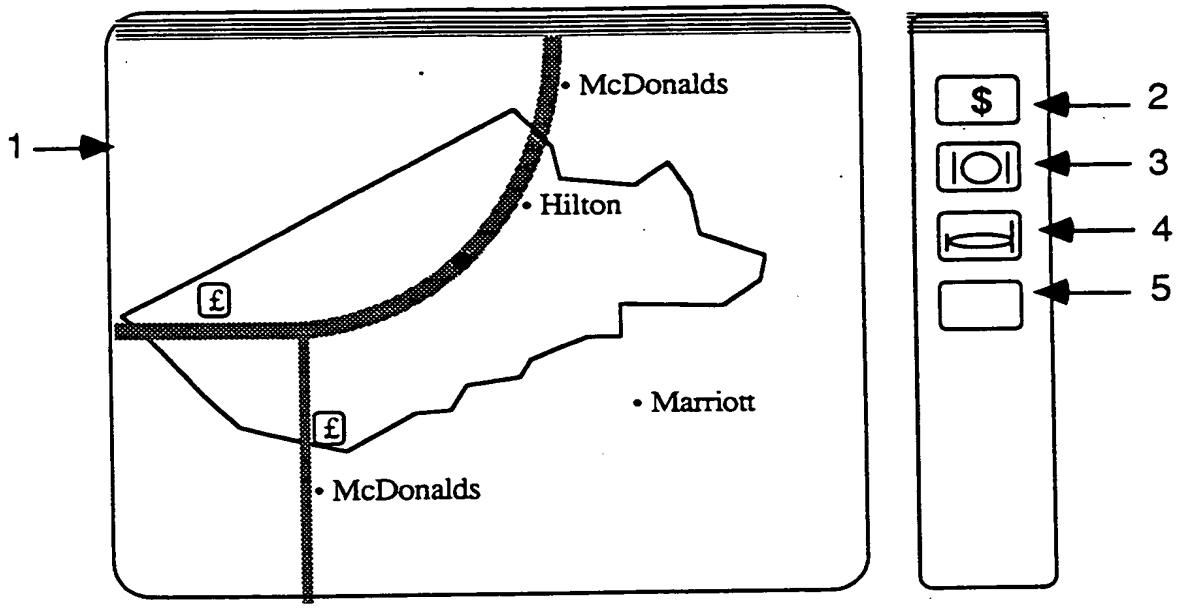
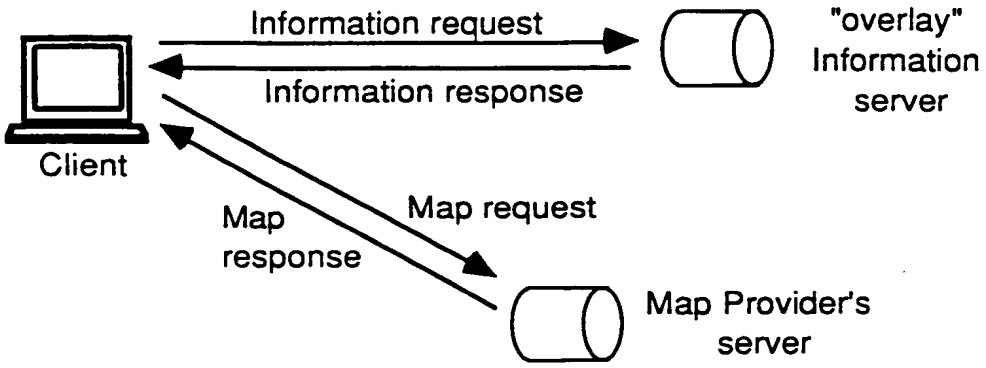


Figure 3


Information request
Information response
"overlay"
Information
server
Client
Map request
Map
response
Map Provider's
server